Remarks

Claims 1-22 are pending in this application. Claims 1-3, 7-14, and 18-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Idleman et al. (U.S. Patent No. 6,154,850) in view of Fabre (U.S. Pub. No. 2002/0120797). Claims 4-6 and 15-17 stand objected to as being dependent upon a rejected base claim.

The invention involves throughput optimization by activation of selected parallel channels in a multichannel tape drive. Many of the newer tape drives can read and write data at very high data transmission rates; however, not all computers and networks or applications can match the data transfer rates generated by this new generation of tape drives. Traditionally, when interfacing a high-speed tape drive to an infrastructure unable to support the high-speed data transfer rates, a variable speed control was used in the tape drive to slow the tape drive to match the tape drive throughput to the interface. However, this approach is limited by how slow the throughput speed can be set while still maintaining proper tape tension and fly height control. Another approach involves tape back hitches wherein the tape is stopped, backed up, and then resumed as needed to reduce average tape drive throughput. This approach may cause excessive wear on both the tape drive and the medium.

According to the invention, throughput optimization is achieved by activation of selected parallel channels in a multichannel tape drive. For example, claim 1 recites a method for adjusting the rate of data transfer between a high-speed multi-channel tape drive and a network interface. The method comprises determining a maximum throughput capability of the network interface. The method further comprises selecting a number of active data channels in the high-speed tape drive. The number of active data channels is selected to match tape drive throughput to the maximum throughput capability of the network interface. In response to selecting a number of active data channels in the tape drive, the selected number of active data channels are enabled, and the remainder of the data channels are disabled.

Advantageously, the invention makes it possible to match tape drive throughput to the maximum throughput capability of the network interface, while avoiding some of the problems that may occur when using traditional approaches, such as variable speed control and back hitches.

Regarding Idleman, Idleman describes various aspects of data storage systems, and particularly focuses on a system including two controllers that work together to provide redundancy of access control and sequencing (Figure 3). Idleman does not describe or suggest matching tape drive throughput to the maximum throughput capability of a network interface, let alone make any suggestion of the particular claimed method of doing so.

The Examiner acknowledges that Idleman does not disclose maximizing the throughput to match the tape drive throughput with the network interface throughput capability. In making the rejection, the Examiner relies on Fabre as a secondary reference.

This is no motivation to modify Idleman in view of Fabre to achieve the claimed invention. First, Fabre does not overcome the acknowledged shortcomings of Idleman. And second, Idleman could not be modified to achieve the claimed invention.

Fabre describes adaptive run-time data transfer optimization. In more detail, Fabre is about optimizing data transfer between a CPU and a peripheral. Specifically, Fabre discusses problems with existing approaches for optimizing data transfer, and Fabre's proposed solution to this problem involves a computer software driver that performs a calibration function and performs data transfer in accordance with the calibration result. More specifically, the calibration portion of the software driver is described as including an I/O rate profiler that transfers data samples to the peripheral, receives performance feedback from the peripheral, and selects the optimum result as a model for further data transfer.

It is important to note that Fabre is about preventing the CPU from overwhelming a slower peripheral. The software driver for controlling access to the peripheral

includes calibration functions such that after calibration, further data transfers are limited by the software driver to an acceptable rate.

On the other hand, claim 1 recites a specific way to match tape drive throughput to the maximum throughput capability of the network interface. This is completely different than any teaching in Fabre. Fabre is about a calibrating software driver to optimize data transfer to a peripheral. Fabre does not overcome the deficiency of Idleman.

With further regard to Idleman, the Examiner directs attention to Idleman's grouping of tape units into logical units. As Idleman points out, "a logical redundancy group may be divided into more than one such data group. The addressing sequence and arrangement of the data blocks in each logical data group are configurable to divide the tape storage apparatus into multiple logical data areas each having different bandwidth rate characteristics." Column 3, lines 29-34. With multiple logical data areas having different bandwidth rate characteristics, there is no motivation to modify Idleman to match throughput to the capability of the network interface. After all, Idleman specifically expresses flexibility of the logical data areas in that they have different bandwidth characteristics. In any event, neither Idleman nor Fabre describes or suggests the claimed feature of "wherein the number of active data channels is selected to match tape drive throughput to the maximum throughput capability of the network interface."

For reasons given above, claim 1 is believed to be patentable. Claim 12 is an independent claim reciting a system for adjusting the rate of data transfer between a high-speed multi-channel tape drive and a network interface, and is also believed to be patentable for reasons given above. The remaining claims are dependent claims and are also believed to be patentable.

Some of the dependent claims are also believed to recite further patentable subject matter. For example, claims 2 and 13 recite marking the tape cartridge including storing information as to which channels were selectively enabled or disabled during the write

process. The Examiner mentions that Idleman discloses marking codeword bytes on individual tape units to indicate where data is to be written. This clearly does not suggest the claimed feature.

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